



**EMPOWERING INNOVATIONS**

***IVT RNA  
Raw Materials***

**FOR CUTTING-EDGE RESEARCH  
AND ADVANCEMENTS**

*The first successful report of the use of in vitro transcribed (IVT) mRNA in animals was published in 1990 after reporter gene mRNAs were injected into mice. Scientists have been using the in vitro transcribed (IVT) RNA approach to create therapies and vaccines for decades due to its short development time, high safety, high specificity, and simple manufacturing.*

**[croyezbio.com](http://croyezbio.com)**

# The Application of IVT RNA Technology



**Therapeutics**



**Vaccine**



**Drug Discovery**



**Basic Research**



*CRISPR/ Cas Gene Editing*



*In Vivo Production of Secretable Protein/ Antibody*



*Reprogramming Cells*

## The Workflow of IVT RNA Preparation



*Target Design and DNA Template Generation*



*Plasmid Production, Purification, and Linearization*



*RNA Synthesis*



*RNA Purification*



*Analytics*



*Formulation*



*Lab Use/  
Industrial Manufacturing*

## A. mRNA capping

### RNA Transcript



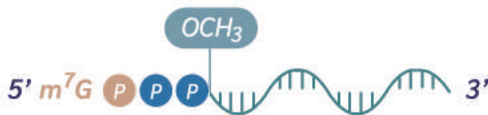
+ Vaccinia Capping Enzyme

### Cap-0 mRNA



+ mRNA Cap 2'-O-Methyltransferase

### Cap-1 mRNA



- ↑ • Stability
- Initiate translation
- ↓ • Degradation
- Immunogenicity

| Cat#         | Product                         | Package |
|--------------|---------------------------------|---------|
| C15037-500U  | Vaccine Capping Enzyme          | 500 U   |
| C15038-2000U | mRNA Cap 2'-O-Methyltransferase | 2,000 U |

## Key Elements for Improving the Performance of mRNA

### B. Modified nucleotide

Pseudouridine ( $\Psi$ ) and N1-Me-pUTP (m1 $\Psi$ ) can be used to replace uridine in the IVT mRNA. It is demonstrated that the modified UTP can enhance RNA stability and decrease anti-RNA immune response.

### Synthetic mRNA

↑  $\Psi$  / m1 $\Psi$



- ↑ • Stability
- Translation efficiency
- ↓ • Degradation
- Immunogenicity

| Cat#         | Product                    | Package     |
|--------------|----------------------------|-------------|
| C15040-100UL | Pseudo UTP Sodium Solution | 100 $\mu$ L |
| C15041-100UL | N1-Me-pUTP Sodium Solution | 100 $\mu$ L |

## The Critical Quality Management of mRNA Purity - dsRNA Detection Assay

| Cat#         | Product                        | Package     |
|--------------|--------------------------------|-------------|
| C15039-200UG | Anti-dsRNA antibody [clone J2] | 200 $\mu$ g |

When developing IVT mRNA-based therapies or vaccines, high-quality and purity in vitro transcribed mRNA is of the utmost importance. Double-stranded RNA (dsRNA) impurities are one of the extremely concerning byproducts because they would inhibit the synthesis of the antigen protein and trigger an unfavorable immunological response.

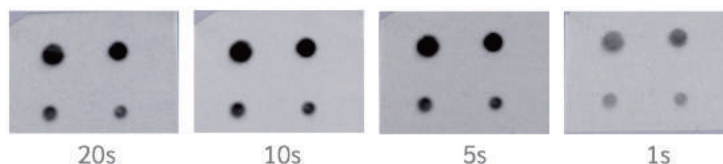
### Features

- High Sensitivity
- High Specificity
- Cost-effective

### dsRNA Amount

- 2.5  $\mu$ g
- 1.3  $\mu$ g
- 0.6  $\mu$ g
- 0.3  $\mu$ g

### Exposure



20s

10s

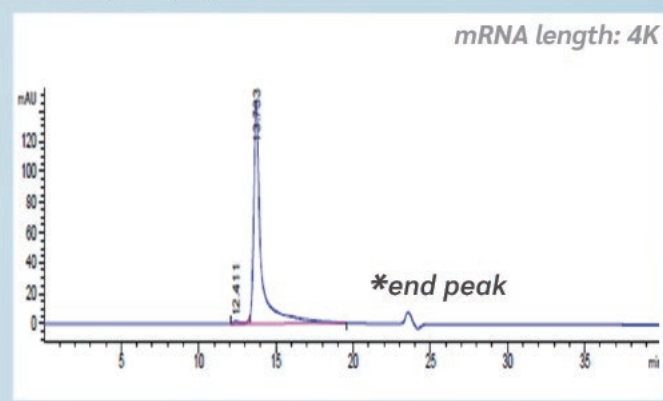
5s

1s



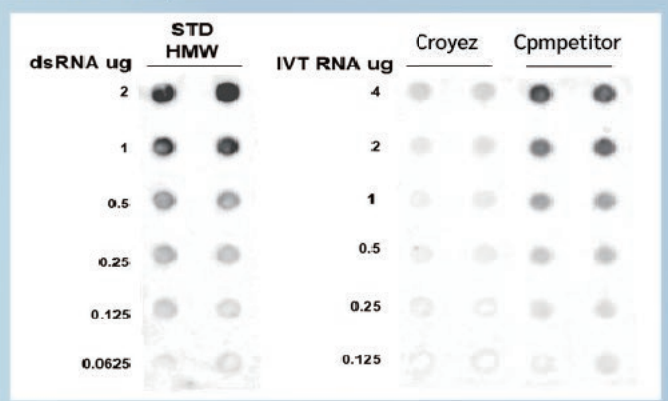
# High Quality Final mRNA Products by Using Croyez's Raw Materials

## mRNA purity by SEC-HPLC



Croyez's final mRNA product has a extremely high purity.

## dsRNA Analysis



Croyez's final mRNA product has a significantly lower concentration of dsRNA byproducts compared to the competitor's product.

## Comprehensive Solutions for IVT RNA Production

- Generate high quality and high purity IVT mRNA
- Flexible formulation buffers to assist you find the optimal condition

| Cat#            | Product   | Package  |
|-----------------|---|----------|
| C15009-K01      | NTP Set, 100 mM Solutions                                 | 1 mL*4   |
| C15010H-25000U  | T7 RNA Polymerase (200 U/ $\mu$ L)                        | 25,000U  |
| C15027-K01      | T7 RNA Polymerase Transcription Buffer Set                | 10,000 U |
| C15027-K02      | *Include buffer A~I (200 U/ $\mu$ L)                      | 25,000 U |
| C15010HA-25000U | T7 RNA Polymerase with specific buffer A(200 U/ $\mu$ L)  | 25,000U  |
| C15010HB-25000U | T7 RNA Polymerase with specific buffer B (200 U/ $\mu$ L) |          |
| C15010HC-25000U | T7 RNA Polymerase with specific buffer C (200 U/ $\mu$ L) |          |
| C15010HD-25000U | T7 RNA Polymerase with specific buffer D (200 U/ $\mu$ L) |          |
| C15010HE-25000U | T7 RNA Polymerase with specific buffer E (200 U/ $\mu$ L) |          |
| C15010HF-25000U | T7 RNA Polymerase with specific buffer F (200 U/ $\mu$ L) |          |
| C15010HG-25000U | T7 RNA Polymerase with specific buffer G (200 U/ $\mu$ L) |          |
| C15010HH-25000U | T7 RNA Polymerase with specific buffer H (200 U/ $\mu$ L) |          |
| C15010HI-25000U | T7 RNA Polymerase with specific buffer I (200 U/ $\mu$ L) |          |
| C15022-1ML      | ATP Solution (100 mM)                                     | 1 mL     |
| C15023-1ML      | UTP Solution (100 mM)                                     | 1 mL     |
| C15024-1ML      | CTP Solution (100 mM)                                     | 1 mL     |
| C15025-1ML      | GTP Solution (100 mM)                                     | 1 mL     |
| C15026-10U      | Inorganic Pyrophosphatase (Yeast)                         | 10U      |
| C15026-50U      |   | 50U      |

